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Mole Street Journal, October 2007

University of Arkansas, Fayetteville. Dept. of Chemistry and Biochemistry

UNIVERSITY of ARKANSAS 1871
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The Mole Street Journal

Volume 6, Issue 9

Adams Gets National Cancer Institute Grant


Paul Adams

Paul Adams received a grant from the National Cancer Institute branch of NIH for his research entitled "Biophysical studies of oncogenic Cdc42Hs constructs." in the amount is $661,000 from September 2007-2012. Adams is an assistant professor in the biochemistry division.

This innovative research project is designed to delineate the processes by which changes in Cdc42 and its interaction with regulators and targets affect various important signal transduction pathways.

Cdc42 (Cell division cycle 42) is a member of the Ras family of proteins, which were one of the first cancer causing proteins to be identified. Mutants or abnormal expression of Ras proteins have been found in up to 30% of cancer cell types, hence these proteins play a significant role in cellular events leading to malignant transformation. To date, achievements have been made in understanding the pathogenesis of cancer. However, one of the major challenges still facing the biomedical community is the limited development of therapeutic strategies to tackle this disease.

Continued on page 3.

Arkansas INBRE Research Conference

ARKANSAS INBRE
IDeA Networks of Biomedical Research Excellence

All faculty, staff, researchers and students are invited to participate in the Arkansas INBRE Research Conference, Nov. 9-10 in Fayetteville. No prior affiliation with INBRE is required.

Registration deadline is October 13. Many events require registration. For the complete schedule and to register see

http://chemistry.uark.edu/1733.htm

Participation in the poster session is open to all. Those who receive funding from INBRE, COBRE or ABI are encouraged to make poster presentations.

The featured speaker is Robert Greenler, Professor Emeritus of Physics, University of Wisconsin-Milwaukee, who will present "Reading the Sky's Icy Halos." He will give a different lecture as part of the UA Physics Centennial Lectures Thursday, Nov. 8.

Schedule of Events

Department participation is highlighted below. See Web site for full schedule.

Friday, November 9

Talks at the Arkansas Union, workshops and tours on campus. Faculty mixer at the Cosmopolitan Hotel and banquet at the Fayetteville Town Center.

The Chemistry Building will be open for self-guided tours from 3 p.m. to 5 p.m.

Julie A. Stenken will present "Decoding the in Vivo Chemical Conversations among Cells," from 1:40 p.m. to 2:10 p.m.

Jack Lay will conduct workshops "Peptide Mass Fingerprinting by Mass Spectrometry: Theory," at 3 p.m. and "Peptide Fingerprinting and Sequencing by MALDI TOF: Hands On," at 4 p.m.

Luti Salisbury will conduct a workshop "Finding Scholarly Resources in Science (Chemistry, Physics and Biology): An Information Literacy Tutorial," at 3 p.m. and 4 p.m.

Lisa C. Childs, UA Patent Attorney for the Division of Agriculture and Associate Vice Provost for Research will conduct a workshop "Intellectual Property: A Brief Overview of Patents, Copyrights, Trademarks, and Trade Secrets," at 3 p.m.

Saturday, Nov. 10

Poster session and breakfast buffet at the Cosmopolitan Hotel. Talks and presentation of poster awards at the Center for Continuing Education.

Paul Adams will conduct a workshop **"**Cultural Diversity in Diverse Scientific Workplaces," Saturday at 10:30 a.m. Graduate student Bridgette Blackman will assist.

Donald R. Bobbitt will conduct a workshop "Making the Most of INBRE," Saturday at 10:30 a.m.

This conference is sponsored by the Arkansas INBRE with additional support provided by the Arkansas Biosciences Institute. It is hosted by the departments of biological sciences, physics, and chemistry and biochemistry.

Faculty News

Research News

Ryan Tian's research on nanowire scaffolding continues to gain attention. An article "Longer Implants with Nanowire Coats," was published on page 14 in the October issue of *Materials Today*.

On the Go

Matt McIntosh gave a seminar at Arkansas Tech University Sept. 28.

Joshua Sakon made presentations at the American Bone Mineral Research, 29th Annual Meeting, in Hawaii Sept. 16-19.

"Arathyroid Hormone Analog Targeted To Bone Is More Effective at Increasing Bone Mineral Density in Mice," Ponnapakkam TP, Sakon J, Matsushita, O. and Gensure, R.

"Biophysical characterization of collagen binding domain," Leena, PST, Matsushita, O, Sakon, J.

Lothar Schäfer presented "Quantum Reality as a Basis for the Pre-Darwinian Conception of Evolution by Natural Law," in UA physics Sept. 21.

Julie Stenken will present "Microdialysis Sampling for Monitoring Biochemical Conversations" Oct. 5, as the first UA Sigma Xi chapter seminar series.

Ryan Tian gave a seminar at Pittsburg State University Sept. 21.

Publications

Recent publications from the Koeppe lab.

"Bilayer Thickness and Membrane Protein Function: An Energetic Perspective," Andersen, O.S. and Koeppe, R.E., II (2007) *Annu. Rev. Biophys. Biomol. Struct.* 36,107–130.

"Multivariate Data Analysis for Enhanced Interpretation of Electrochemical Impedance Spectra of Gramicidin-Ion Interactions in Phospholipid Monolayers," Lindholm-Sethson, B., P. Geladi, R.E. Koeppe II, O. Jonsson, D. Nilsson, and A. Nelson (2007) *Langmuir23*, 5029-5032.

"Gramicidin Channels: Versatile Tools," Andersen, O. S., R. E. Koeppe, II and B. Roux (2007) in *Biological Membrane Ion Channels. Ed.* S.H. Chung, O.S. Andersen, V. Krishnamurthy. Springer. New York. Chapter 2, pages 33-80.

"Orientation and Motion of Tryptophan Interfacial Anchors in Membrane-Spanning Peptides," van der Wel, P.C.A., N.D. Reed, D.V. Greathouse, and R.E. Koeppe II (2007) *Biochemistry* 46, 7514-7524.

"Docosahexaenoic Acid Alters Bilayer Elastic Properties," Bruno, M.J., R.E. Koeppe II, and O.S. Andersen (2007) *Proc. Natl. Acad. Sci.*, USA 104, 9638-9643.

"Concerning Tryptophan and Protein-Bilayer Interactions," Koeppe, R.E., II (2007) *J. Gen. Physiol.* 130, 223-224.

"Single-molecule Methods for Monitoring Changes in Bilayer Elastic Properties," Andersen, O.S., Bruno, M.J., Sun, H. and R.E. Koeppe II (2007) *Methods in Molecular Biology* 400, 541-568.

"Curcumin is a Modulator of Bilayer Material Properties," Ingolfsson, H. I., Koeppe, R.E., II and O. S. Andersen (2007) *Biochemistry* 46, 10384-10391.

"Helical Distortion in Tryptophan and Lysine Anchored Membrane-spanning Alpha Helicesas A Function of Hydrophobic Mismatch: A Solid-state Deuterium NMR Investigation Using the Gala Method," Daily, A.E., Greathouse, D.V., van der Wel, P.C.A and R.E. Koeppe II (2007) *Biophys. J.* 93, in press.

Recent publications from the Arkansas Statewide Mass Spectrometry Facility

"Differential Expression of Mitochondrial and Extramitochondrial Proteins in Lympocytes of Male Broilers with Low and High Feed Efficiency," Lassiter, K., C. Ojano-Dirain, M. Iqbal, N.R. Pumford, N. Tinsley, J. Lay, R. Liyanage, T. Wing, M. Cooper and W. Bottje, *Poultry Science*, 85(12), 2251-2259 (2006).

"Ionization Methods for the Analysis of Microorganisms," Lay Jr., J.O. and R. Liyanage, The Encyclopedia of Mass Spectrometry, M.L. Gross, ed, Volume 6, Molecular Ionization, (2007).

"Reducing Fragmentation Observed in the Matrix-asisted Laser Desorption/ ionization Time-of-flight Mass Spectrometric Analysis of Triacylglycerols in Vegetable Oils," Gidden, J. Liyanage, R., Durham, B., and Lay, Jr., J.O., *Rapid Commun. In Mass Spectrom*., 21, 1951-7 (2007).

"Structures of Pahayokolides A and B, Two Cyclic Peptides from a Lyngbya Sp," An, T., Krishnaswamy, S.K., Wang, M., Liu, L., Lay, Jr., J.O., Liyanage, Rl, Berry, J., Gantar, M., Marks, V., Gawley, R.E., and Rein, K.S., *J. Nat. Prod*., 70, 730-735 (2007).

"Identification and Characterization of Thymosin Beta-4 in Chicken Macrophages using Whole Cell MALDI-TOF," Kannan, L., Rath, N.C., Liyanage, R., and Lay, Jr., J.O., *Proceedings of the New York Academy of Science*, in press.

"Effects of Processing Methods on the Proximate Composition and Momordicosides K and L Content of Bitter Melon Vegetable," Donya, A., Hettiarachchy, N., Liyanage, R., Lay, J., Chen, P., and Jalaluddin, M., J. *Agric. Food Chem.*, 55, 14, 5827 - 5833, 2007

"Identification and Quantification of Glycoside Flavonoids in the Energy Crop Albizia Julibrissin," Lau, C.S., Carrier, D.J., Beitle, R.R., DI Bransby, L.R. Howard, J.O. Lay Jr, R. Liyanage, and E.C. Clausen *Bioresour. Technol.*, 98(2): 429-35 (2007).

Student News

Graduate student **Mike Rutherford** has passed the appropriate number of cumulative exams and is now an official doctoral candidate. His doctoral advisor is Z. Ryan Tian.

October Safety Tip

If you can smell the chemistry — you are doing something wrong

Adams continued from page 1

Adams believes strategies that will have high impact on the development of future target-based molecular inhibitors or therapeutic drugs to potentially control cellular transformation events leading to cancer must showcase new molecular features of Ras proteins involved in cell signaling pathways that facilitate cell proliferation and transformation, tumor invasion, and metastasis.

The research to be performed over the 5-year grant period will see biophysical techniques, such as NMR and fluorescence spectroscopy used to define the structural biology of two constructs of Cdc42 that modulate its ability to transform cells. There are unique structural features in oncogenic forms of Cdc42 that serve to modify the specificity of interactions with various effector and/or regulatory proteins that then regulate transformation, proliferation, invasion, or metastisis.

One study will see the structural biology of Cdc42-nucleotide free characterized. It is known that an important oncogenic effector protein can interact tightly with Cdc42, has a high affinity for the nucleotide-depleted form of Cdc42, and promotes rapid nucleotide exchange leading to oncogenic cell transformation. The premise for this work is that the structure and dynamics of the nucleotide-free state of Cdc42Hs will reveal significant changes in the protein that facilitate weakened GDP-binding, leading to dissociation and excessive activation due to the presence of GTP that might facilitate potentially devastating protein interactions that lead to cellular transformation.

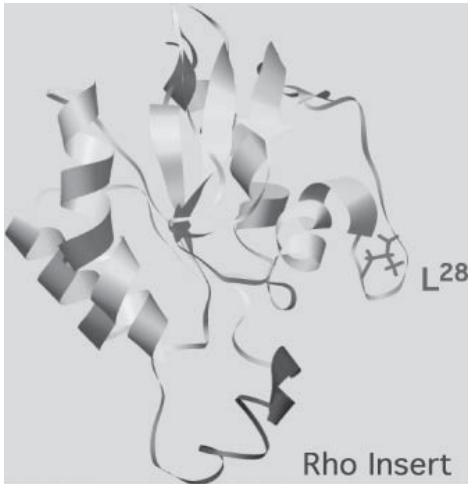

Figure 2. Solution structure of Cdc42(F28L) (2ASE.pdb) outlining Phe to Leu28 mutation (purple), and the Rho insert region to be removed (blue) for structural biological studies in Adams' lab.

A second study will be performed during the award period that will define the contribution of a certain region of a sub-family of the Ras proteins, of which Cdc42 is a member. An oncogenic mutant of Cdc42, Cdc42(F28L) (Figure 2) is known to be cell transforming due to an increased rate of exchange between its active –GTP bound form, and its inactive –GDP bound forms. When a 13-amino acid region in Cdc42 (designated the Rho insert region), unique to the Rho subfamily of proteins, is removed from Cdc42F28L, efficient cycling between GTP-GDP bound states occurs, but the transformation ability of the mutant protein is lost. The premise for these studies is that the structure and dynamics of this double mutant of Cdc42 will outline the conformational changes in the protein, and how these changes alter the interaction(s) with effector proteins that facilitates oncogenic events without disturbing the spontaneous exchange between GTP and GDP.

From the Library by Luti Salisbury

New Version SciFinder

SciFinder has just released a new version of its searching software for both Mac and Windows systems. This new version features several enhancements, including:

Categorize: view your search results by broad category such as Toxicology, Food, Medicine, etc.

Combine: add together search results from substance, reference, or reaction searches.

Export: create reports on chemical substances in MS Excel format.

Explore: launch a new structure search by clicking on any substance in an answer set.

SciFinder Scholar must be used on the UA campus and requires special software. The software may be downloaded at http://libinfo.uark.edu/eresources/scifinder.asp

ChemNetBase

Did you know that we subscribe to ChemNetBase online?

ChemNetBase consists of the following dictionaries and handbooks:

- Dictionary of Commonly Cited Compounds
- Dictionary of Drugs
- Dictionary of Inorganic and Organometallic Compounds
- Dictionary of Natural Products
- Dictionary of Organic Compounds
- The Handbook of Chemistry & Physics (NEW EDITION!)
- Polymers: A Property Database
- Properties of Organic Compounds
- CRCPress Periodic Table Online (FREE!)

These titles can be accessed directly through InfoLinks under Title or through the Chemistry and Biochemistry Library home page at http://libinfo.uark.edu/chemistry, choose chemistry databases, then dictionaries and encyclopedias.

New Books

Coghill, A.M. and Garson, L.R. 2006. *The ACS Style Guide*. Oxford: ACS.

Koch, C.C. et. al. 2007. *Structural Nanocrystalline Materials: Fundamentals and Applications*. New York: Cambridge Press.

Training Sessions

E-mail lsalisbu@uark.edu if you plan to attend.

- Monday, Oct. 7 from 2:30 p.m. to 3:00 p.m. - ISI Current Contents.

This session will show you how to set up a profile so that you can automatically receive recent references on your topic and/or contents page of journals sent to your e-mail account.

- Wednesday, Oct 9, from 10:30 a.m. to 11:30 a.m. - Refworks training for CHBC databases. This session will show you how to export references from SciFinder Scholar, PubMed, ISI web of Science and Beilstein to the online citation manager, RefWorks, and to automatically print your bibliography in any style format. It will also demonstrate how to write-n-cite in your paper, thesis, dissertation, etc. using the citations stored in your own database.

Luti Salisbury is available for individual research consultations and for classroom instruction. E-mail lsalisbu@uark.edu or phone 5-8418

Semester Calendar

October

03..... Early progress grade reports for 1000 and 2000 level classes will be e-mailed to student's University e-mail account
08..... Department Seminar
11..... Department Picnic at the Gardens
11..... Trade Show, CHEM 105
15..... Department Seminar
18-19 ..... MASUA conference
22..... Department Seminar
26..... Last date to drop a full semester class or classes with a mark of "W"

Fall At-A-Glance

November

09-10 ..... Fall INBRE conference
19..... Fry Lecture, Fraser Stoddart, UCLA
21..... Fall Break, NO CLASSES, U of A is open
22-23 ..... Thanksgiving Holiday, U of A CLOSED

December

04..... Last date to officially withdraw from all full semester classes for the fall 2007 and last day of classes
05..... Department Holiday Potluck
05..... Dead day, NO CLASSES
05..... Final copies of master's thesis/doctoral dissertations must be submitted to the Graduate School for December 2007 graduation
06-12 ..... Final exams
24-January 1..... U of A CLOSED

- Dates above are also on the Web CT calendar http://WebCT.uark.edu/
- For more academic dates see http://www.uark.edu/registrar/classes/calcover.html
- To see what is going on in the Fulbright College see http://fulbright.uark.edu

October Seminars

01 .....Peter O'Connor, Boston University
08 .....Ayyalusamy Ramamoorthy, University of Michigan
15 .....Kenneth S. Suslick, University of Illinois at Urbana-Champaign
22.....Lingjun Li, University of Wisconsin-Madison

Seminars take place most Mondays during the fall semester at 3:30 p.m. in CHEM 144. A reception takes place before each seminar in CHEM 105 at 3 p.m. The complete list of seminar speakers is available @ http://chemistry.uark.edu/1690.htm

Department Picnic - New Location

The annual department picnic is October 11 at the Gardens off Razorback Rd. Families welcome. Dinner served @ 6:30 p.m. For more information contact Heather Jorgensen.

October Birthdays

01.....Rohana Liyanage
03.....Nicholas Gleason
09.....Leslie Johnson
11.....Christopher Mazzanti
13.....Gwen Mattice
16.....Andy Williams
19.....Daniel Sanders
20.....Zheng Li
21.....Don Bobbitt
21.....Jeff Ward
21.....Tomasz Janowski

The publishing of birthdays is not intended to invade the privacy of anyone. If you prefer not to be included, please let us know.

Library Hours

Chemistry and Biochemistry

Fall Hours

Monday - Thursday....8 a.m. to 9 p.m.
Friday .....8 a.m. to 6 p.m.
Sunday.....2 p.m. to 6 p.m.

Closed Saturdays

http://libinfo.uark.edu/chemistry/

Fall Cume Dates

Cumulative exam dates for graduate students are below. Exams take place in CHEM 144 from 5 p.m. to 6 p.m.

- October 19
- November 9
- November 30

The Department of Chemistry and Biochemistry at the University of Arkansas strives for excellence in research, teaching and service in chemistry—the central science.

We aspire to positions of leadership regarding the discovery of new scientific knowledge, the training of students, and the economic development of the State of Arkansas.

We seek to recruit and retain a diverse group of the best faculty, students and staff to address the challenges of the future through interdisciplinary and multidisciplinary research and education.

The Mole Street Journal is an internal monthly publication of the chair Bill Durham. Editor Jennifer Sims.